

WHAT IS CLAIMED IS:

1. A process of preparing a rubber composition is comprised of at least one mixing step comprised of, based upon parts by weight per 100 parts by weight rubber (phr) mixing a rubber composition in an internal rubber mixer, wherein said rubber composition is comprised of, to the exclusion of addition of free sulfur and sulfur vulcanization accelerator(s):
 - (A) at least one diene-based elastomer,
 - (B) about 10 to about 200 phr of reinforcing filler composed of:
 - (1) about 15 to about 100 weight percent of said filler as a composite of silica-containing carbon black having silica domains on its surface wherein said silica domains contain hydroxyl groups on their surface; and,
 - (2) from zero to about 85 weight percent of at least one additional synthetic precipitated silica, which contains hydroxyl groups on the surface thereof and non-silica containing rubber reinforcing carbon black, and
 - (3) a coupling agent as a bis(3-triethoxysilylpropyl) polysulfide having an average of from 2 to 4 connecting sulfur atom in its polysulfidic bridge; wherein said mixing step comprises mixing said rubber composition in said internal rubber mixer to a pre-determined temperature thereof, wherein said pre-determined temperature is within a range of about 120°C to about 190°C, and while continuing to mix said rubber composition in said mixer, mixing said rubber composition under an extended mixing condition in said internal rubber mixer at a temperature within about 10°C of said pre-determined temperature for an extended mixing period of from about 0.5 to about 15 minutes.
2. The process of claim 1 of preparing a rubber composition comprised of at least one mixing step comprised of, based upon parts by weight per 100 parts by weight rubber (phr) mixing a rubber composition in an internal rubber mixer, wherein said rubber composition is comprised of, to the exclusion of addition of free sulfur and sulfur vulcanization accelerator(s):
 - (A) at least one diene-based elastomer,
 - (B) about 30 to about 100 phr of reinforcing filler composed of:
 - (1) about 50 to about 95 weight percent of said filler as a composite of

silica-containing carbon black having silica domains on its surface wherein said silica domains contain hydroxyl groups on their surface; and,

(2) from about 5 to about 50 weight percent of at least one of synthetic precipitated silica, which contains hydroxyl groups on the surface thereof and non-silica containing rubber reinforcing carbon black, and

(3) a coupling agent as a bis(3-triethoxysilylpropyl) polysulfide having an average of from 2 to 2.6 connecting sulfur atom in its polysulfidic bridge to the exclusion of a bis(3-trialkoxysilylalkyl) polysulfide having an average of greater than 2.6 connecting sulfur groups in its polysulfidic bridge;

10 wherein said mixing step comprises mixing said rubber composition in said internal rubber mixer to a pre-determined temperature thereof, wherein said pre-determined temperature is within a range of about 140°C to about 180°C, and while continuing to mix said rubber mixture in said mixer, mixing said rubber composition under an extended mixing condition in said internal rubber mixer at a temperature within 15 about 10°C of said pre-determined temperature for an extended mixing period of from about one to about 5 minutes.

3. The process of claim 2 wherein said additional reinforcing filler is a precipitated silica.

20 4. The process of claim 2 wherein said additional reinforcing filler is a non-silica containing rubber reinforcing carbon black.

25 5. The process of claim 2 said additional reinforcing filler is a combination of precipitated silica and non-silica containing rubber reinforcing carbon black.

6. The process of claim 1 wherein said silica-containing carbon black is prepared by:

30 (A) co-fuming carbon black with at least one silica precursor selected from at least one of silanes, silicone oil and silicates at an elevated temperature to provide a composite of carbon black with integral discrete silica domains primarily on the outer surface of the carbon, or by

(B) co-precipitating carbon black and silica from a dispersion of carbon black

in sodium silicate, to provide integral silica domains, on the outer surface of the carbon black.

7. The process of claim 2 wherein said silica-containing carbon black is prepared by co-fuming carbon black with at least one silica precursor selected from at least one of silanes, silicone oil and silicates at an elevated temperature to provide a composite of carbon black with integral discrete silica domains primarily on the outer surface of the carbon.

10 8. The process of claim 2 wherein said rubber composition is exclusive of a functionalized silica other than said carbon black/silica composite.

15 9. The process of claim 1 wherein the temperature of said diene-based elastomer of said rubber composition, prior to or upon introduction to said internal rubber mixer is less than about 40°C.

20 10. The process of claim 1 wherein said rubber composition is mixed in at least one additional, subsequent, sequential mixing step in an internal rubber mixer, exclusive of said extended mixing conditions, followed by mixing said rubber composition with sulfur and at least one sulfur vulcanization accelerator for a period of about 1 to about 6 minutes to a temperature in a range of about 100°C to about 120°C.

25 11. The process of claim 2 wherein said rubber composition is mixed in at least one additional, subsequent, sequential mixing step in an internal rubber mixer, exclusive of said extended mixing conditions, followed by mixing said rubber composition with sulfur and at least one sulfur vulcanization accelerator for a period of about 1.5 to about 3 minutes to a temperature in a range of about 100°C to about 120°C.

30 12. The process of claim 2 wherein said rubber composition is removed from said internal rubber mixer(s) following each mixing step and cooled to a temperature below about 40°C prior to the subsequent mixing step.

13. The process of claim 1 wherein said bis(3-triethoxysilylpropyl) polysulfide

contains an average of from 2 to 2.6 connecting sulfur atoms in its polysulfide bridge to the exclusion of a bis(3-triethoxysilylpropyl) polysulfide having greater than an average of 3 connecting sulfur atoms in its polysulfidic bridge.

5 14. The process of claim 1 wherein said silica domains of said composite of silica treated carbon black comprise at least 10 percent of said composite and wherein a range of about 50 to about 65 percent of the surface of said carbon black is covered by said domains.

10 15. A rubber composition prepared by a process comprised of the process of claim 1.

15 16. A rubber composition prepared by a process comprised of the process of claim 2.

17. An article of manufacture having at least one component comprised of the rubber composition of claim 15.

20 18. A tire having at least one component comprised of the rubber composition of claim 15.

19. A tire having a tread comprised of the rubber composition of claim 15.

20. A tire having a tread comprised of the rubber composition of claim 16.